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MB DOCKET NO. 02-70

Federal Communications Commission Media Bureau staff economist, Peter Alexander, and Nodir Adilov, Department of Economics, Cornell University, recently co-authored two staff research papers relevant to the issues in the cable ownership rulemaking[1] and AT&T-Comcast[2] proceedings. By this Public Notice, we inform interested parties that the Commission will consider these two papers in its deliberations in the above referenced proceedings. These papers represent the individual views of their authors and do not necessarily reflect the views of the Commission, any commissioner, or other staff member.

The first paper, Media Bureau Staff Research Paper No. 13, entitled, "*Asymmetric Bargaining Power and Pivotal Buyers,*" examines the potential impact of horizontal mergers on buyer bargaining position. This study shows that. in the case where bargaining power is asymmetric, it is possible that large merged firms might extract greater concessions from program suppliers than smaller buyers. These results suggest that horizontal merger might be used as a strategy to enhance bargaining position.

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[1] *See Implementation of Section 11 of the Cable Television Consumer Protection and Competition Act of 1992, Implementation of Cable Act Reform Provisions of the Telecommunications of 1996, Commission's Cable Horizontal and Vertical Ownership Limits and Attribution Rules. Review of the Commission's Regulations Governing Attribution of Broadcast and Cable/MDS Interests. Review of the Commission's Regulations and Policies Affecting Investment in the Broadcast Industry, Reexamination of the Commission's Cross-Interest Policy*, CS Docket Nos. 98-82, 96-85, MM Docket Nos. 92-264, 94-150, 92-51, 87-154, Further Notice of Proposed Rulemaking, 16 FCC Rcd 17312 (2001) ("*Further Notice*").

[2] *See Applications for Consent to the Transfer of Control of Licenses from Comcast Corporation and AT&T Corp., Transferors, to AT&T Comcast Corporation. Transferee*, MB Docket No. 02-70, Public Notice, DA 02-733 (rel. March 29, 2002) ("*Public Notice*"), *as modified by* Public Notice, *Erratum and Order Extending Filing Deadline*, DA 02-70 (rel. May 3, 2002).

The second paper, Media Bureau Staff Research Paper No. 14, entitled, ***"Most-Favored Customers in rhe Cable Industry,"*** explores the implications of most-favored-customer clauses in the cable industry. This paper finds that the introduction of a most-favored-customer clause for large buyers will increase their profitability and that the seller's profits may decrease. The paper then compares its results to the Bykowsky-Kwasnica-Sharkey experiments' regarding the effect of a most-favored-customer agreement and finds that the two sets of results are consistent.

The Media Bureau Staff Research Paper Series is a forum for the Media Bureau to examine issues that are relevant to our mission. In addition, these papers will provide information to the Commission in order to stimulate debate.

Both the rulemaking and the license transfer proceedings are "permit-but-disclose'' for purposes of the Commission's ***ex parte*** rules.[4] ***Ex parre*** communications will be governed by section 1.206(b) of the Commission's rules.' We urge interested parties submitting written ***ex parte*** presentations or summaries of oral ***ex parte*** presentations in this proceeding to use the Electronic Comment Filing System ("ECFS") in accordance with the Commission procedures set forth in the Commission's ***Further Notice*** in the cable ownership proceeding' and its March 29, 2002 *Public Norice* in the AT&T/Comcast license transfer proceeding.' If using paper ***ex parre*** submissions, interested parties must file an original and one copy with the Commission's Secretary, Marlene H. Dortch, and should follow the procedures set forth in the aforementioned cable ownership ***Further Notice*** and the March 29, 2002 AT&T-Comcast *Public Norice* for sending their submissions by mail, commercial overnight courier, or hand delivery. Additionally, interested parties must submit their ***ex parre*** filings to the persons identified in the cable ownership ***Further Notice*** and the March 29, 2002 AT&T-Comcast *Public Norice.*

Copies of these papers may be obtained from Qualex International, Portals 11,445 12th Street, SW, Room CY-B402, Washington, DC 20554, and will also be available through ECFS. These documents are also available for public inspection and copying during normal reference room hours at the Commission's Reference Information Center, 445 12th Street, SW, CY-A257, Washington, DC 20554. The documents will be posted on the Media Bureau's website at <http://www.fcc.gov/mb>

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[3] *See* Mark Bykowsky, Anthony M. Kwasnica and William Sharkey, Federal Communications Commission **Office** of Plans and Policy. OPP Working Paper No. *35.* *"Horizontal Concentration in the Cable Television Industry: An Experimental Analysis,"* (rel. June 3, 2002).

[4] *See generally* 47 C.F.R. §§1.1200-1.1216.

[5] 47 C.F.R. § 1.1206(b).

[6] ***See Further*** *Notice,* 16 FCC Rcd at 17371 ¶ 132.

[7] *See* ***Public Notice.***

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2002-

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FEDERAL ***COMMUNICATIONS COMMISSION***

MEDIA BUREAU STAFF RESEARCH PAPER

Asymmetric Bargaining Power and Pivotal Buyers

By Nodir Adilov and Peter J. Alexander

September 2002

Asymmetric Bargaining Power and Pivotal Buyers

Nodir Adilov and Peter J. Alexander

September 25, 2002

ABSTRACT

Raskovich (2000) suggests that becoming pivotal through merger worsens thr merging buvers bargaining position. We show that these results hold ni the case where buyer hargaining power is equal across buyers. but riot in the case where bargaining power is asymmetric. We demonstrate it is possible when there are asymmetries in bargaining power that larger buyers. including pivotal buyers, can extract greater gains from trade than smaller buvers. We show that this result holds even if the supplier's value function is convex. These results imply that horizontal merger might be used as a strategy to enhance liargaining position

Introduction

In this paper. we extend the work of Raskovich (2000) and explore the case of asymmetric bargaining power. Building on the work of Chipty and Snyder (1999), Raskovich demonstrated that, under the assumption of constant bargaining power across firm size, 'pivotal' (i.e., large) buyers would be systematically disadvantaged in negotiations with sellers.[1] We show that if bargaining power increases with the size of the buying firm, Raskovich's results do not necessarily hold. On the contrary, large firms may be systematically advantaged in negotiations with sellers.

Chipty and Snyder (1999) and Raskovich (2000) explore simultaneous bilateral bargaining models in which there is a single seller and more than

*Adilov: Department of Economics. Cornell University, email: na47@cornell.edu; Alexander: Federal Communications Commission. email: palexand@fcc.gov. We are indebted to David Sappington for his many thoughtful and useful comments. and ongoing support. Any errors are our own. The views expressed in this paper are those of the authors, and do not necessarily represent the views of the Federal Communications Commission, any of its Commissioners. or other staff.

[1] Chipty, Tasneem and Christopher Snyder, "The Role of Firm Size in Bilateral Bargaining: A Study of the Cable Television Industry." *The Review of Economics and Statistics*, May, 1999, 81(2), 326-340; Raskovich, Alexander. "Pivotal Buyers and Bargaining Position." Economic Analysis Group Discussion Paper 00-9, U.S. Department of Justice, Anti-Trust Division. October. 2001.

several buyers. Both assume that the gains from trade are divided equally (i.e., 50-50), irrespective of hrni size. Chipty and Snyder suggest that the effect on bargaining position of a merger by two (or more) buyers can be determined by the curvature of the supplier's value function, and they demonstrate that if the supplier's value function is concave, the merger will enhance the buyer's bargaining position; if the value function is convex, the merger will worsen the the buyer's bargaining position. Raskovich generalizes Chipty and Snyder's model by introducing a pivotal buyer; that is, a buyer so large that only the buyer can completely cover the supplier's costs. Thus, the large firm is "on the hook" for the supplier's costs The result is thar merger worsens a buyer's bargaining position

In what follows, we generalize the approach of Chipty and Snyder (1999) and Raskovich (2000) by relaxing the assumption of equal division of the gains from trade. We denionstrate that, an equilibrium exists when the division of the surplus varies across firms, and we analyze the case where bargaining power is assumed to increase in firm size.

We offer several plausible reasons why bargaining power might, be increasing in firm size First, a merger may augment the set of useful information regarding prices and other contractual terms the previously non-merged firms' possessed Second, if there are differences in bargaining skills between the merging firms, the nierger may result, in the retention of the more-skilled bargaining team. Third, the merged firm may have a lower risk aversion coefficient. Fourth, the merged firm may be more patient, i e . it may riot discount the future as much as the previously non-merged firms may have.[2] Regardless, our goal in this paper is simply to explore the outcome of the hilateral bargaining model as if bargaining power is asymmetric, an assumption we see as no more or less heroic than any other.

After extending the rriodel of Raskovich (2000) to incorporate asymmetric, bargaining power, we thrn show that: (1) the results of the bargaining solution employed by Chipty and Snyder and Raskovich are robust to any constant division of thr trade surplus (e.g., 80-20, 60-40, etc.) and not simply 50-50; (2) the curvature of the value function may no longer he a reliable rule-of-thumb method for evaluating the change in bargaining position and hence the effect of mergers on sellers; (3) the post-merger bargaining position of the merged hrni may improve even though the merged firm becomes pivotal; and (4) a merger may decrease the merged firms' transfer payments and decrease the seller's transfer revenues.

Perhaps the simplest way to demonstrate the potential effects of asymmetric bargaining power is by example. We preface the example by introducing a hargaining power parameter that can vary across firms, and denote the i^{th} buyer's bargaining power by $\alpha_i \in (0,1)$, where a higher

[2] We thank Alex Raskovich for his discussion relating to these reasons.

value of α means greater bargaining power.[3]

Now, assume that we have three buyers, each with different valuations of the seller's product, and each with different levels of bargaining power. For example, assume that $v_A = 80$, $v_B = 56$, and $v_C = 40$, and that $\alpha_A = .8$, $\alpha_B = .4$, and $\alpha_C = .3$. T_i denotes the transfer price for the i^{th} buyer. The level of seller costs, F, is 50. It is easy to demonstrate that, under these conditions, buyer B is pivotal, whereas buyers A (with the highest valuation of the seller's product) and C (with the lowest valuation of the seller's product) are not pivotal. Note that, for Raskovich (2000), buyers A and B would be pivotal. We see that $T_A = (1 - \alpha_A) \cdot v_A = (0.2 \cdot 80) = 16$ and that $T_C = (1 - \alpha_C) \cdot v_C = (0.7 \cdot 40) = 28$. It is immediately clear that $T_A + T_C = 44 < 50 = F$. Further, we note that $T_B = (1 - \alpha_B) \cdot (v_B - F + T_A + T_C) + (F - T_A - T_C) = (0.6 \cdot 50 + 6) = 36$. Observing that, $T_A + T_B = 16 + 36 = 52 > 50$ and $T_B + T_C = 64 > 50$, it is clear that buyer A and buyer C are not pivotal, and that buyer B is pivotal. In fact, as we see from the example, $T_B > T_C > T_A$, i.e., the buyer with the highest valuation pays the least. Thus, in a framework with asymmetric bargaining power, pivotal buyers can derive significant benefits.

The rest of the paper is organized as follows. First, we extend Raskovich's (2000) model and show that under more general assumptions an equilibrium still exists. Next, we show that the introduction of asymmetric bargaining power can improve the buying firm's bargaining position (even if the firm is pivotal). We also show that in the presence of asymmetric bargaining power the 'curvature test' of the value function can be a misleading indicator of the effects of merger on bargaining position; i.e., that the bargaining position of the merged firm can improve even if the the value function is convex. Finally, we make some concluding remarks.

Nash Equilibrium with Bargaining Power

In this section we extend Raskovich's (2000) model to accommodate asymmetric bargaining power. We begin by constructing the transfer prices faced by pivotal and non-pivotal buyers and then show that an equilibrium exists under conditions more general than Raskovich's.

Following Raskovich (2000), we assume the i^{th} buyer's surplus is given by $v_i = (q_i, q_{-i})$, while the supplier's gross surplus equals $V(Q)$, where $Q = \sum_{i=1}^{n} q_i$. Specifically, $V(Q) = A(Q) - C(Q)$, where $A(Q) \equiv$ ancillary revenue, and $C(Q) \equiv$ total cost. The supplier will produce iff:

$$V(Q) + \sum_{i=1}^{n} T_i \geq 0 \tag{1}$$

[3] For Raskovich (2000), $\alpha_1 = \alpha_2 = \alpha_n = \frac{1}{2}$. In fact, Raskovich's pivotal result will hold for any constant value $\alpha = \alpha_1 = \alpha_2 = \ldots = \alpha_n$, where $\alpha \in (0, 1)$. Note that, α_i represents the share of surplus **kept** by buyer i.

We also note that:

$$q_i^* = \arg\max_x [v_i(x, q_{-i}) + V(Q_{-i} + x)] \tag{2}$$

where we assume there exists a q_i^* that maximizes joint surplus.[4] Buyer i is pivotal iff:

$$V(Q_{-i}) + \sum_{j \neq i} T_j < 0 \tag{3}$$

and

$$\max[v_i(x, q_{-i}) + V(Q_{-i} + x)] + \sum_{j \neq i} T_j \geq 0 \tag{4}$$

where $v_i(0, q_{-i}) = 0$[5]

The transfer price (incorporating asymmetric bargaining power and using it notation) becomes, for a non-pivotal buyer, $T_i = (v_i + (V - V_{-i}))(1 - \alpha_i) - (V - V_{-i})$ which can be written as:

$$T_i = v_i(1 - \alpha_i) - \alpha_i(V - V_{-i}) \tag{5}$$

Next, noting that $\sum_{j \neq i} T_j + V_{-i} < 0$, we see that, the transfer price for a pivotal buyer can be written as $T_i = [v_i + (\sum_{j \neq i} T_j + V)](1 - \alpha_i) - V - \sum_{j \neq i} T_j$ or as:

$$T_i = v_i(1 - \alpha_i) - \alpha_i(\sum_{j \neq i} T_j + V) \tag{6}$$

Definition 1: A Nash Equilibrium in purchased quantities $(q_1^*, q_2^*, \ldots, q_n^*)$ and transfer prices $(T_1, \ldots, T_n)$ is that, for which the following hold simultaneously for all i:

$$q_i^* = \arg\max_x (v_i(x, q_{-i}^*) + V(\sum_{j \neq i} q_j^* + x)) \tag{7}$$

$$T_i = v_i(x, q_{-i}^*)(1 - \alpha_i) - \alpha_i(V(Q^*) - V(Q^* - q_i^*)) \tag{8}$$

$$\text{if } \sum_{j \neq i} T_j + V(Q^* - q_i^*) \geq 0$$

$$T_i = v_i(x, q_{-i}^*)(1 - \alpha_i) - \alpha_i(\sum_{j \neq i} T_j + V(Q^*)) \tag{9}$$

$$\text{if } \sum_{j \neq i} T_j + V(Q^* - q_i^*) < 0$$

[4] We assume that the surplus from trade is positive at the optimal quantity for any buyer. This implies that $v_i + V - V_{-i} > 0$ for all i.

[5] Raskovich has the restriction that $V_{-1} \leq V_{-2} \leq \ldots \leq V_{-n} \leq V$, while we allow V_{-i} to vary across buyers.

$$\sum_{j=1,\dots,n} T_j + V(Q^*) \geq 0 \tag{10}$$

In what follows, we rank order the $i < k$ buyers such that $(v_i + (V - V_{-i}))(1 - \alpha_i) \geq (v_k + (V - V_{-k}))(1 - \alpha_k)$. This implies that the buyer with the highest valuation is not necessarily the buyer with the highest transfer price.

Lemma 1. If buyer i satisfies the conditions for being pivotal, then buyer h, such that $h < i$, also satisfies the condition for being pivotal.

Proof of Lemma 1: The proof is by contradiction. Suppose that i is pivotal and that h, $h < i$, is not pivotal. We note that $T_i = (1 - \alpha_i)v_i - \alpha_i(V + \sum_{j \neq i} T_j)$ and that $T_h = (1 - \alpha_h)v_h - \alpha_h(V - V_{-h})$. Then, $T_h - T_i = (1 - \alpha_h)v_h - \alpha_h(V - V_{-h}) - (1 - \alpha_i)v_i + \alpha_i(V + \sum_{j \neq i} T_j)$=$(1 - \alpha_h)v_h + (1 - \alpha_h)(V - V_{-h}) - (V - V_{-h}) - (1 - \alpha_i)v_i - (1 - \alpha_i)(V - V_{-i}) + (1 - \alpha_i)(V - V_{-i}) + \alpha_i(V + \sum_{j \neq i} T_j)$. Let $b_i = (v_i + V - V_i)(1 - \alpha_i)$. Next, by substitution, we re-write this expression as $T_h - T_i = b_h - b_k + V_{-h} - V_{-i} + \alpha_i V_i + \alpha_i(\sum_{j \neq h} T_j + T_h - T_i)$ or $T_h - T_i = \frac{1}{1-\alpha_i}(b_n - b_k) + (V_{-h} - V_{-i}) + \frac{\alpha_i}{1-\alpha_i}(\sum_{j \neq h} T_j + V_{-h})$. Noting that $\frac{1}{1-\alpha_i}(b_h - b_k) \geq 0$ and that $\frac{\alpha_i}{1-\alpha_i}(\sum_{j \neq h} T_j + V_{-h}) \geq 0$, we write $T_h - T_i \geq V_{-h} - V_{-i}$ and thus, $V_{-i} - T_i \geq V_{-h} - T_h$. Adding $\sum_j T_j$ to both sides we get $V_i + \sum_{j \neq i} T_j \geq V_{-h} + \sum_{j \neq h} T_j \geq 0$. This implies that $V_i + \sum_{j \neq i} T_j \geq 0$, which is a contradiction. Q.E.D.[6]

Lemma 2: It production is efficient,, $\sum_{j=1}^{n} v_j + V \geq 0$, then the outcome in which all buyers are pivotal satisfies the supplier's participation constraint.

Proof of Lemma 2: $\sum_{j=1}^{n} T_j + V = \dots = \frac{1}{1 + \sum_{j \leq p} \frac{\alpha_j}{1-\alpha_j}}(\sum_{j=1}^{n} v_j + V) \geq 0$

Now, denote by $T_i(p)$ the transfer price for buver i when first, **p** buyers are pivotal.

[6] Consider a possible equilibrium with p pivotal buyers. Lemma 1 implies that (5) holds for $i > p$ and that (6) holds for $(i \leq p)$. Next, we note that (6) can be written as $T_i = v_i(1 - \alpha_i) - \alpha_i(V + \sum_{all_j} T_j) + \alpha_i T_i$ or as $T_i = v_i - \frac{\alpha_i}{1-\alpha_i}(V + \sum_j T_j)$. Summing across the i's we see that $\sum_j T_j = \frac{1}{1 + \sum_{j \leq p} \frac{\alpha_j}{1-\alpha_j}}(\sum_{j \leq p} v_j + \sum_{j > p}(1 - \alpha_j)v_j - \sum_{j \leq p} \frac{\alpha_j}{1-\alpha_j} V + \sum_{j > p} \alpha_j (V_{-j} - V))$ which we can write as:

$$T_i = v_i - \frac{\alpha_i}{1-\alpha_i} V - \frac{\frac{\alpha_i}{1-\alpha_i}}{1 + \sum_{j \leq p} \frac{\alpha_j}{1-\alpha_j}}\Big(\sum_{j \leq p} v_j + \sum_{j > p}(1 - \alpha_j)v_j - \sum_{j \leq p} \frac{\alpha_j}{1-\alpha_j} V + \sum_{j > p} \alpha_j (V_{-j} - V)\Big) \tag{11}$$

Lemma 3: If $\sum_{i\neq p} T_i(p) + V \geq 0$ then $\sum_{i\neq p} T_i(p-1) + V \geq 0$

Proof of Lemma 3: By contradiction assume that $\sum_{i\neq p} T_i(p)+V \geq 0$ and $\sum_{i\neq p} T_i(p-1)+V < 0$. Then, $(\sum_{i\neq p} T_i(p)+V)-(\sum_{i\neq p} T_i(p-1)+V) = \sum_{i\neq p} T_i(p)-(\sum_{i\neq p} T_i(p-1)) = \sum_{i\neq p-1}(\frac{\alpha_i}{1-\alpha_i}[\sum_{j=1}^{n} T_j(p-1)-\sum_{j=1}^{n} T_j(p)])$. Next, we see that $T_p(p-1)-T_p(p) = (1+\sum i \leq p-1\frac{\alpha_i}{1-\alpha_i})(\sum_{j=1}^{n} T_j(p-1)-\sum_{j=1}^{n} T_j(p))$. Since $T_p(p-1)-T_p(p) < 0$, i.e., the pivotal payment is always greater than the non-pivotal, we get $\sum_{i\neq p} T_i(p)-\sum_{i\neq p} T_i(p-1) < 0$, which is a contradiction. Q.E.D.

Proposition 1: If production is efficient, then there exists an equilibrium where only the first p buyers are pivotal.

Proof of **Proposition 1** See Raskovich(2000) [7]

Merger Effects

Using the results from the previous section, we explore the potential effects of merger on bargaining power, and compare these results with Chipty and Snyder (1999) and Raskovich (2000). As we demonstrate, once potential asymmetries are introduced into the bargaining solution, the results of Chipty and Snyder and Raskovich may not hold. In fact, the introduction of even a modest amount of bargaining power can have significant effects on bargaining position.

We begin by assuming there are two non-pivotal merging firms, A and B, and then show the conditions under which a merger between the firms increases their bargaining position.

Note that the net surplus for buyer A before a merger is given by $(v_A + V^S - V^S_{-A})\alpha_A$, and the net surplus for buyer B before a merger is given by $(v_B + V^S - V^S_{-B})\alpha_B$. The net surplus after a merger is $(v_{AB} + V^M - V^M_{-AB})\alpha_{AB}$, assuming, that AB is non-pivotal as in Chipty and Snyder (1999). We note that A and B have the incentive to merge iff:

$$(v_{AB} + V^M - V^M_{-AB})\alpha_{AB} > (v_A + V^S - V^S_{-A})\alpha_A + (v_B + V^S - V^S_{-B})\alpha_B \quad (12)$$

We can write (12) as $v_{AB} + V^M - V^M_{-AB} > (v_A + V^S - V^S_{-A})\frac{\alpha_A}{\alpha_{AB}} + (v_B + V^S - V^S_{-B})\frac{\alpha_B}{\alpha_{AB}}$, letting $DE = v_{AB} - v_A - v_B$ where DE is downstream efficiency, $UE = (V^M - V^M_{-AB}) - (V^S - V^S_{-AB})$ where UE is upstream efficiency, and:

$$\begin{aligned} BP = {} & (v_A + V^S - V^S_{-A})\frac{\alpha_{AB}-\alpha_A}{\alpha_{AB}} + (v_B + V^S - V^S_{-B})\frac{\alpha_{AB}-\alpha_B}{\alpha_{AB}} \\ & +(V^S_{-A} + V^S_{-B} - V^S - V^S_{-AB}) \end{aligned} \quad (13)$$

[7] Raskovich notes that the equilibrium may not be unique.

where BP is the firm's bargaining position. Combining these conditions yields:

$$DE + UE + BP > 0 \tag{14}$$

Recall that by assumption (see footnote 4) $v_A + V^S - V^S_{-A}$ and $v_B + V^S - V^S_{-B}$ are positive. Therefore, if $\alpha_{AB} > \alpha_A$ and $\alpha_{AB} > \alpha_B$, then $(v_A + V^S - V^S_{-A})\frac{\alpha_{AB}-\alpha_A}{\alpha_{AB}} + (v_B + V^S - V^S_{-B})\frac{\alpha_{AB}-\alpha_B}{\alpha_{AB}} > 0$. Noting that for Chipty and Snyder (1999), $BP^{CS} = V^S_{-A} + V^S_{-B} - V^S - V^S_{-AB}$, and given our formulation in (13), clearly, $BP > BP^{CS}$. Thus, in the presence of asymmetric bargaining power, Chipty and Snyder's (1999) result underestimates the positive effect of bargaining power on post-merger bargaining position, since bargaining position in the context of asymmetric bargaining power can be positive even if $BP^{CS} < 0$. Thus, bargaining position can increase even if $V''(Q) > 0$, i.e., even if V is convex.[8]

Next, following Raskovich (2000), assume that buyers A and B merge and become pivotal. The merger is profitable iff:

$$\alpha_{AB}v_{AB} + \alpha_{AB}(\sum_{j\neq AB}(T_j^M + V^M)) > \alpha_A(v_A + V^S - V^S_{-A}) + \alpha_B(v_B + V^S - V^S_{-B})$$

which we note is equivalent to $v_{AB} + \sum_{j\neq AB}(T_j^M + V^M) > (v_A + V^S - V^S_{-A})\frac{\alpha_A}{\alpha_{AB}} + (v_B + V^S - V^S_{-B})\frac{\alpha_B}{\alpha_{AB}}$. We decompose this expression into three parts: $DE = v_{AB} - v_A - v_B$, $UE = (V^M - V^M_{-AB}) - (V^S - V^S_{-AB})$, and

$$\begin{aligned} BP = {} & (v_A + V^S - V^S_{-A})\tfrac{\alpha_{AB}-\alpha_A}{\alpha_{AB}} + (v_B + V^S - V^S_{-B})\tfrac{\alpha_{AB}-\alpha_B}{\alpha_{AB}} \\ & + (V^S_{-A} + V^S_{-B} - V^S - V^S_{-AB}) + \theta(\textstyle\sum_{j\neq AB} T_j^M + V^M_{-AB}) \end{aligned} \tag{15}$$

where $\theta = 1$ if AB is pivotal, and $\theta = 0$ if AB is not pivotal. It is immediately clear that (15) is the general case of (13). Thus, (15) can be written as

$$BP = (v_A + V^S - V^S_{-A})\frac{\alpha_{AB} - \alpha_A}{\alpha_{AB}} + (v_B + V^S - V^S_{-B})\frac{\alpha_{AB} - \alpha_B}{\alpha_{AB}} + BP^R$$

Clearly, $BP > BP^R$. According to Raskovich, if the merged buyer becomes pivotal, its bargaining position worsens, since the last term in (15) is negative. However, this worsening of bargaining position can be offset by an increase in bargaining power that increases the first two terms of (15).

The measures of Chipty and Snyder (1999) and Raskovich (2000) may under-estimate bargaining position because they abstract from any positive effects of bargaining power for the merging firm. Once this effect is accounted for, the curvature of the value function is no longer a reliable

[8] Under Chipty and Snyder, concavity (convexity) of the value function implies the bargaining position of the merged firm improves (worsens).

rule-of-thumb method for evaluating the change in bargaining position and hence the effects of the merger on sellers. Moreover. despite Raskovich's prediction that pivotal buyers would be disadvantaged by merger. we have shown that increasing bargaining power can improve the bargaining position of the. now pivotal. merged firm.

Conclusion

Raskovich (2000j suggested that becoming pivotal through merger worsens the merging buyers' bargaining position. We have shown that these results hold in thr case where buyer bargaining power is constant, hut, not necessarily in the case where bargaining power increases with firm size. We demonstrated that larger buyers. including pivotal buyers. can extract, greater gains from trade than smaller buyers when there are asymmetries in bargaining power. Chipty and Snyder (1999) and Raskovich (2000)may under-estimate bargaining position because they abstract from the possibility that bargaining power may increase with firm size. Once this effect, is accounted for. the curvature of the value fnnction is no longer a reliable rule-of-thumb method for evaluating the change in bargaining position and hence the effects of tlie merger on sellers. hloreover. despite Raskovich's prediction that pivotal buyers would be disadvantaged by merger, we have shown that increasing bargaining power can improve the bargaining position of the, now pivotal, merged firm.

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MEDIA BUREAU STAFF RESEARCH PAPER

Most-Favored Customers In the Cable Industry

By Nodir Adilov and Peter J. Alexander

September 2002

Most-Favored-Customers in the Cable Industry

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September 25. 2002

ABSTRACT

In this paper. we explore the implications of most-favored-customer clauses in the cable industry. We show that the introduction of a most-favored-customer clause for large buyers will increase their profitability, and that the seller's profits mav decrease. We examine the experimental cable bargaining results of Bykowsky, Kwasnica, and Sharkev (2002), and compare these results to our model. We find that the results of the Bykowsky-Kwasnica-Sharkey experiments regarding the effect of a most-favored-customer agreement are consistent with our findings.

I Introduction

In this paper. we explore the use of 'most-favored-customer' clauses (hereafter. MFC) in the cable industry.[1] We examine the impact of MFC clauses on bargaining outcomes between buyers and sellers. arid show that these outcomes depend on the market, share of the larger buyers and the relative valuation of the seller's programniing to different buyers.

The paper is organized as follows. We begin with the general case with many buyers and sellers. and show that in the absence of capacity constraints and MFC arrangements the competitive outcome obtains. We then introduce channel capacity constraints. and demonstrate that the competitive outcome still obtains. Next; we explore the case of large firms and hIFC clauses. We show that the introduction of MFC clauses can disadvantage sellers arid small buyers. We find that as the market share of the large buyer increases. smaller buyers are more likely to be disadvantaged.

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[1] The MFC represents a formal or quasi-formal arrangement by which the larger buyer pays *no* more than the highest amount of any smaller buyer

Specifically, we find that if there are differences in the relative valuation of programming among buyers such that, the larger buyer has a greater per-customer valuation, smaller buyers may be precluded from access to the programming because of its relative expense. In the penultimate section. we extend our model to accommodate the methodology utilized in the experimental studies conducted by Bykowsky, Kwasnica, and Sharkey (2002)[2] Our prediction that an MFC arrangement yields market power is supported by their data.[3] Finally: we make some concluding remarks.

II The General Case of Multiple Buyers and Sellers

Assume that risk neutral content providers(also known as cable networks)have positive fixed (sunk) costs of producing and zero marginal costs of distributing their product. These content providers will be referred to as sellers (of programming). There are I sellers. The sellers earn revenue by selling their product, to cable owners. The cable owners will be referred to as buyers.

For simplicity, we begin by assuming that sellers make a 'take it or leave it' offer to each prospective buyer and denote by $T_{1,i}, T_{2,i}, \ldots, T_{M,i}$ the total payments *to* seller i from buyers $1.2.\ldots, M$ respectively, if the product is sold. There are M buyers; each of whom has $N_1, N_2, \ldots, N_M$ subscribers, where $\sum_{m=1}^{M} N_m = N$.

We assume that buver m has positive fixed costs F_m and zero program provision costs (an assumption we relax later in the paper). We note that, given I sellers with I products. every buyer has 2^I possible programming choices We denote a programming choice of buying only seller i's program by E_1^i, where subscript 1 denotes the program package consisting of only one program and the superscript i denotes seller i. The programming package consisting of 2 products, e.g., products from seller k and seller l, is given by $E_2^{k,l} \equiv E_1^k + E_1^l \equiv E_1^k \cup E_1^l$

The program package that includes all programs from all sellers is denoted by E, or $E_I^{1,2,\ldots,I}$. The revenue that buver m can derive from programming package $\tilde{E}$ is denoted by $V_m(\tilde{E})$. Buyer m's objective is to maximize profits

$$\pi_m = V_m(\tilde{E}) - \sum_{i:E_1^i \in \tilde{E}} T_{m,i} \tag{1}$$

[2] Bykowsky, Mark. Anthony Kwasnica, and William Sharkey, "Horizontal Concentration in the Cable Television Industry An Experimental Analysis," Federal Communications Commission, Office of Plans and Policy, Working Paper Series Number 35. June. 2002

[3] Bykowsky, Kwasnica, and Sharkey use the term 'most-favored-nation' which follows the tradition in the experimental literature. We prefer to use the term 'most-favored-customer' for the sake of precision. Both terms as used refer to the same thing.

by choice of programming package E. We assume that, the value of any combination of programs is positive. and that the 'value correspondence' satisfies decreasing marginal returns. More formally, we assume thar for any buyer m. any two programming packages $\hat{E}$ and $\tilde{E}$, and for any seller i s program such that $E_1^i \not\subseteq$ E ∪ E. the following inequality holds:

$$V_m(\hat{E} + E_1^i) - V_m(\bar{E}) \geq V_m(\hat{E} + \tilde{E} + E_1^i) - V_m(\hat{E} + \tilde{E}) > 0 \qquad (2)$$

i.e.. V_m is sub-modular.

Claim **1:** With M buyers and I sellers. the **unique** Nash Equilibrium trarisfer price foi- each seller k to buyer m is:

$$_k = V_m(E_I) - V_m(E_I - E_1^k) \qquad (3)$$

and all buyers buy programs from all sellers.

Proof of Claim **1:** First, we show that if there is a Nash Equilibrium: it is an equilibrium where all buyers buy from all sellers Second. we show that in the equilibrium where all buyers buy from all sellers. *(3)* must hold. Finally. we prove by induction that the transfer price $T_{m,i}$ is in fact, a unique Nash Equilibriiim transfer price.

By contradiction, assume that in some Nash Equilibrium, buyer m did not, buy the program from seller i. Tlien. seller i's payoffs from buyer m are zero. Now, denote by E' tlie value of the set, of programs bought by buyer m. Since $V(E^* + E_1^i) > V(E^*)$, seller a is strictly better off (i. obtains positive payoffs) bv charging any transfer price in the set, T E $[0. V(E^* + E_1^i) - V(E^*)]$, arid buyer m finds it optimal to buy from seller i.

Next. assume that there is a Nash Equilibrium where all buyers buy from all sellers. Tlien. it must be the case that, buyer m prefers buying froni all sellers to buying from any set, of $(I - 1)$ sellers; i.e., the following condition holds for all m and k:

$$V_m(E_I) - \sum_{i=1}^{I} T_{m,k} \geq V_m(E_I - E_1^k) - \sum_{i=1}^{I} T_{m,i} - T_{m,k} \qquad (4)$$

Assume (4) holds with a strict inequality for anv seller l. Then, seller l can increase it's payoffs by increasing the transfer price by an epsilon small amount, while condition **(4)** still holds for all $k = 1, \ldots, I$. This is a contradiction. Tlierefoi-e. (4) must hold with equality $V_m(E_I) - \sum_{i=1}^{I} T_{m,i} = V_m(E_I - E_1^k) - \sum_{i=1}^{I} T_{m,i} - T_{m,k}$. which simplifies to (3).

We have shown that for all sellers it is optimal to charge $T_{m,k}$. In order to ensure that, this is in fact a, Nash Equilibrium, we must check that for any buver m the value of buying from all sellers is greater than or equal to the value of any programming package from the remaining $2^I - 1$ possibilities. To begin: denote by $T_{m,k}^n$ the transfer price defined in *(3)* when there are a total of $I = n$ sellers. Clearly, when $I = 1$,

$$T_{m,k}^1 = V_m(E_1^1) \qquad (5)$$

is a Nash Equilibrium of the game. arid all buvers buy from the seller.

Now. assume rhat $T^n_{m,k}$ is a Nash Equilibrium outcome for some $I = n \geq 1$. Tlieri. it suffices to show that $T^{n+1}_{m,k}$ is also a Nash Equilibriuni. which we do by showing that buyer m's benefit, from buving all available $n + 1$ programs is positive. We note that, $V_m(E_{n+1}) - \sum_{i=1}^{n+1} T^{n+1}_{m,i}$ equals $V_m(E_{n+1} - E_1^{n+1}) - \sum_{i=1}^{n} T^{n+1}_{m,i}$ We then note that $V_m(E_{n+1} -$ E;'''') $-$ $\sum_{i=1}^{n} T^{n+1}_{m,i} \geq V_m(E_{n+1} - E_1^{n+1}) - \sum_{i=1}^{n} T^n_{m,i} \geq V_m(E_n) - \sum_{i=1}^{n} T^n_{m,i} \geq 0$ where the last inequality holds due to our assumption that $T^{n+1}_{m,i} = T^n_{m,i}$

Any buver m's payoffs are positive when there are $n+1$ sellers charging $T^{n+1}_{m,i}$. and this buver is better off buying $n + 1$ programs than any program package consisting of n programs. But,, we know from our induction assumption for $I = n$. that when there are n sellers: buying from all sellers is preferred to all other choices. Therefore, with $n + 1$ sellers. buying from all $n + 1$ sellers is preferred to any other programming package. Then, for $I = n + 1$. a Nash Equilibrium consists of sellers charging $T^{n+1}_{m,i}$ and all buvers buying from all sellers. By construction this Nash Equilibrium is unique. Q.E.D.

One simple interpretation of Claim 1 is straightforward: when there are no capacity restraints. cable operators buy all network programs. However, in practice. cable operators do not. buy from all sellers. We offer several explanations which we explore in the next two sections. First, we argue that there mav exist capacity constraints on cable operators. Second, we explore the possible effects on program carriage in the presence of so-called 'most-favored-customer' clauses. In these cases, larger buyers are able to obtain prices that are at least, as favorable as the prices secured by the smaller buvers. i.e.. smaller buyers do not obtain asymmetric price discounts

III The General Case of Multiple Buyers and Sellers with Capacity Constraints

We introduce the idea of capacity constraints by rioting that the total cost of any given cable operator m, excluding the payments to cable networks. is:

$$TC_m = F_m + \sum_{i=1}^{n} C_m(i) \tag{6}$$

where F_m are the fixed costs arid $C_m(i)$ is the marginal cost of introducing i's program. We assume that $0 \leq F_m$ and $C_m(i) \leq C_m(i + 1)$ for all i and all m. These assumptions capture all possible cost structures with non-decreasing niarginal costs.

We also assume that for any buyer m, any two programs E_1^i and E_1^k, and $\hat{E}$ such that $(E_1^i \cup E_1^k) \cap \hat{E} = \emptyset$ where $V_m(E_1^i) < V_m(E_1^k)$, the inequality

$V_m(E_1^i + \hat{E}) \leq V_m(E_1^k + \hat{E})$ holds Simply put. we are assuming that if a buyer prefers one program to another. the buyer will always prefer this program to the other. regardless of the combination of other programs.

We are non able to show that under these conditions. if buyers cannot influence the bargaining outcomes between other buyers. there is unique Nash Equilibrium outcome. Furthermore. this outcome is efficient,.

Since. by assumption. any given buyer cannot influence bargaining outcomes among other buyers. it suffices to show the result tor only one buyer. We begin with any buyer m. Without loss of generality. we assume that for this buyer $V_m(E_1^1) \geq V_m(E_1^2) \geq \ldots \geq V_m(E_1^{I-1}) \geq V_m(E_1^I) > 0$. If our assumptions hold. there is a unique Nash Equilibrium solutiori such that. If

$$C_m(I) \leq V_m(E_I) - V_m(E_I - E_1^I) \tag{7}$$

then,

$$T_{m,k} = V_m(E_I) - V_m(E_I - E_1^k) - C_m(I) \tag{8}$$

and the buyer buys from all sellers

This is a direct, extension of Claim 1. The condition on the cost, function implies that there is a positive value to be obtained by including an additional program regardless of the current combination of programs. Therefore. all programs will be bought in the unique Nash Equilibrium. The transfer price charged by a seller will be such that the buver is indifferent between buying arid riot buying this additional program. Also, if our assumptions hold. there is a second unique Nash Equilibrium solution such that if

$$C_m(1) \geq V_m(E_1^1) \tag{9}$$

then buyer m does not huy from any seller regardless of the transfer price. The condition placed on the cost structure implies that, the net benefit, from buying any program is negative. Clearly, no programs will be bought in this equilibrium.

Fiirallv. if our assumptions hold, there is a third unique Nash Equilibrium solutiori such that if:

$$C_m(I) > V_m(E_I) - V_m(E_I - E_1^I) \tag{10}$$

and

$$C_m(1) < V_m(E_1^1) \tag{11}$$

then there exists a $k \in \{1, 2, \ldots, I-1\}$ such that $V_m(E_k^{1,2,\ldots,k}) - V_m(E_k^{1,2,\ldots,k} - E_1^k) \geq C_m(k)$ and $C_m(k+1) > V_m(E_{k+1}^{1,2,\ldots,k,k+1}) - V_m(E_{k+1}^{1,2,\ldots,k,k+1} - E_1^{k+1})$ The transfer price is given by:

$$\begin{aligned} T_{m,i} = {} & V_m(E_k^{1,2,\ldots,k}) - V_m(E_k^{1,2,\ldots,k} - E_1^i) - \\ & \max\{C_m(k), V_m(E_k^{1,2,\ldots,k} - E_1^i + E_1^{k+1}) - \\ & V_m(E_k^{1,2,\ldots,k} - E_1^i)\} \end{aligned} \tag{12}$$

for all $\leq i \leq k$. and $T_{m,i} \geq 0$ for $k+1 \leq i \leq I$. In this case. buyer m buys from the first k sellers.

This condition states that the net value of buying just one program is positive. and the net value of buying the last program after buying all other $I-1$ programs in negative. Clearly. there exists a k between 1 and $I-1$ such that the net value of buying from first k sellers (ignoring transfer prices) is positive and the net value of buying from the $(k+1)$'s seller (ignoring transfer prices) is negative. Thus, the buyer will buy. at most. k programs. Since the value of seller i's program is never less than the value of seller $(i+1)$'s program. it is straightforward to see that if seller i is served then seller $i+1$ should also be served in any Nash Equilibrium. This implies that sellers $k+1 \ldots I$ are not served in any Nash Equilibriurn. Seller k must lie served in any Nash Equilibrium. since it can always charge $T_{m,k} = 0$ and the buyer buys from k. either by replacing some of its programs by program k or by keeping all other programs.

Therefore. if there is a Nash Equilibriunr. then all k programs will he bought. If there is a Nash Equilibrium with k sellers served. then it should be the case that the buyer is indifferent between buying from any seller i as compared to not buying from that seller, and to replacing it. with any other program from any of remaining $I-k$ sellers' programs i.e., for $1 \leq i \leq k$, (7) holds. Just as in Claim 1.

$$T_{m,i} \geq 0 \tag{13}$$

and

$$V_m(E_k^{1,2,\ldots,k}) - \sum_{i=1}^{k} C_m(i) - \sum_{i=1}^{k} T_{m,i} \geq 0 \tag{14}$$

and both buyers and sellers accept, these transfer prices. Q.E.D

Optimality implies that all programs that have a marginal value above marginal cost will he broadcast. The claim above shows that under our assumption of constrained capacity, the market outcome is efficient.

IV Most-Favored-Customer Clauses

Assume there are two sellers and two types (sizes) of buyers. Buyer one is large. and is able to obtain hIFC concessions from both sellers. Denote $v_1(1)$ as buyer one's per customer valuation of seller one's product,, $v_1(1+2)$ as buyer one's valuation of having both sellers' products, and $v_2(2)$ as buyer two's valuation of seller two's product,.

We also assume that assumption one: given in equation (Section 1, Equation 2) still holds. i.e., $v_1(1) + v_1(2) > v_1(1+2)$ and $v_2(1) + v_2(2) > v_2(1+2)$. We know that the Nash Equilibrium prices under the non-MFC provisions are $t_{11}^* = v_1(1+2) - v_1(2)$, $t_{12}^* = v_1(1+2) - v_1(1)$, $t_{21}^* = v_2(1+2) - v_2(2)$, and $t_{22}^* = v_2(1+2) - v_2(1)$, where the t^* are the equilibrium non-MFC transfer prices. Using these assumptions. we consider the following four cases.

First. we consider the case where $t^*_{11} \leq t^*_{21}$ and $t^*_{12} \leq t^*_{22}$. In this case. both the MFC and non-MFC treatments give the same prices arid outcomes since the MFC provisions do not restrict the sellers behavior in any fashion.

Second. we explore the case where $t^*_{11} > t^*_{21}$ and $t^*_{12} \leq t^*_{22}$ In this case. the MFC clause only affects the first,seller. and the seller has two options. Seller 1 could charge (A) $t_{11} = t_{21} = t^*_{21}$ in which case both buyers buy from seller one. Seller one's revenue in this case is $N \cdot t^*_{21} = (\sum_{m=1}^{M} N_m) \cdot t^*_{21}$ and seller two's best response to seller one's price is to charge $t_{12} = t^*_{12}$ and $t_{22} = t^*_{22}$. Or. seller 1 could charge (B) $t_{11} = t_{21} = t^*_{11}$ and sell only to buyer one. In this case. seller one's revenue is $N_1 . t^*_{11}$ and seller two's best response is to charge $t_{12} = t^*_{12}$ and $t_{22} = v_2(2)$ if $v_2(1) - t^*_{11} < 0$ and $t_{12} = t^*_{12}$ and $t_{22} = v_2(2) - v_2(1) + t^*_{11}$ if $v_2(1) - t^*_{11} \geq 0$. Seller one prefers B to **A** if $N . t^*_{21} < N_1 . t^*_{11}$ which we write equivalently **as** $\frac{N_1}{N} \cdot (v_1(1+2) - v_1(2)) > v_2(1+2) - v_2(2)$ where $\frac{N_1}{N}$ is firm one's market, share.

Third, we have the case where $t^*_{11} \leq t^*_{21}$ and $t^*_{12} > t^*_{22}$. We notice immediately that this case is symmetric to case two and therefore the results are the same.

Fourth. we have the case where $t^*_{11} > t^*_{21}$ and $t^*_{12} > t^*_{22}$. In this case, the MFC arrangements restrict both sellers: and each seller has three choices: (1) provide the product only to buyer one. *(2)* provide the product to only buyer two. or **(3)** provide the product. to both buyers.

In the table rhat follows. we have listed each of the possible combinations tor the sellers.

Seller. One

		Buyer One	Buver Two	Both Buyers
SellerTwo	Buyer One	a	b	c
	Buyer Two	d	e	f
	Both Buyers	g	n	i

As we shall demonstrate. (h). (d), *(e)*.(f), and (h) can never be part of a Nash Equilibrium. while (a),(i), (c), and (g), can be part of a Nash Equilibrium.

We note immediately that (e) cannot be a Nash Equilibrium. If both sellers serve only buyer *two*. then $t_{21} = t^*_{21}$ and $t_{22} = t^*_{22}$, and then $t_{11} = t^*_{21}$ and $t_{12} = t^*_{22}$. But,at these transfer prices, buver one finds it optimal to buy from both sellers It is also clear that (f) and (h) cannot be Nash for the same reasons given for (P). Next,. assume (b) is a Nash Equilibrium. Then, buyer one buys only from seller one. and buyer two buys only from seller two However This is not incentive compatible for seller two. Seller two can always charge a positive price to buyer one (that buyer one accepts) and increase it's profits. Given the symmetry of (d) and (b), (d) cannot be a Nash Equilibrium.

Next. we explore the conditions under which (a), (i). (c). and (g) are Nash Equilibria.

In the first case. (a) is a Nash Equilibrium if $t^*_{11} \cdot \frac{N_1}{N_1+N_2} \geq V_2(1) > t^*_{21}$ and $t^*_{12} \cdot \frac{N_1}{N_1+N_2} \geq V_2(2) > t^*_{22}$. In this case. buyer one buys both products. and buyer two does not buy any product Seller one's profits are t^*_{11}. and seller two's profits are t^*_{12}.

In the second case. (gj is a Nash Equilibrium if $t^*_{11} \cdot \frac{N_1}{N_1+N_2} \leq t^*_{21}$ and $t^*_{12} \frac{N_1}{N_1+N_2} > t^*_{22}$ or $V_2(1) > t^*_{11} \cdot \frac{N_1}{N_1+N_2} > t^*_{21}$ and $V_2(2) > t^*_{11} \cdot \frac{N_1}{N_1+N_2} > t^*_{22}$ and $N_1 \cdot (t^*_{12} - t^*_{11}) \leq [V_2(2) - V_2(1)](N_1 + N_2)$. In this case. seller one sells to buyer one only. while seller two sells to both buyers.

In the third case. (c) is a, Nash Equilibrium if $t^*_{11} \cdot \frac{N_1}{N_1+N_2} > t^*_{21}$ and $t^*_{12} \cdot \frac{N_1}{N_1+N_2} \leq t^*_{22}$ or $V_2(1) > t^*_{11} \cdot \frac{N_1}{N_1+N_2} > t^*_{21}$ and $V_2(2) > t^*_{11} \cdot \frac{N_1}{N_1+N_2} > t^*_{22}$ and $N_1 \cdot (t^*_{12} - t^*_{11}) \leq [V_2(2) - V_2(1)](N_1 + N_2)$. In this case. seller one sells to both buyers. nnd seller two sells to buyer one only.

Finally. (i) is a Nash Equilibrium if $t^*_{11} \cdot \frac{N_1}{N_1+N_2} \leq t^*_{21}$ and $t^*_{12} \cdot \frac{N_1}{N_1+N_2} \leq t^*_{22}$. In this case, both sellers sell to both buyers.

When the MFC affects both sellers, it is optimal for the sellers to always sell to buyer one In this case, only buyer two's profits potentially decrease. while buyer one's profits are never decreasing. The higher the valuation of the program for the large buyer as compared to the smaller buyer. the more likely that. the smaller buyers will not he able to buy the "MFC" program. This *effect* depends on two basic factors: (1) the large buyer's market share. and (2) the relative per-customer valuation of the programs to different, buyers

V The Bykowsky-Kwasnica-Sharkey Results

Bykowsky, Kwasnica, arid Sharkey (2002). report results of experimental studies that explore bargaining among buyers and sellers in the cable industry. These results give us an opportunity to evaluate the predictive power of our model. However. in order to evaluate the results of these experiments in the context of our MFC model. we must first extend the model given in Section 4 to accommodate multiple buyers and a. sequential bargaining process In the context of this extended model. we can then show that the Bykowsky-Kwasnica-Sharkey experimental results relating to hIFC treatments are broadly consistent with our theory.

We start by modelling a hargaining process with one seller and multiple buyers, and then extend our MFC model to include multiple buyers and sellers. We model this bargaining process as one in which the seller's choices are independent, which implies that a model with a single seller is reasonable. The assumption of independence among buyers is consistent, with the experimental framework employed by Bykowsky, Kwasnica. and Sharkey (2002) Finally, we extend our model to accommodate informational asymmetries.

We begin by assuming that without a most-favored-customer provision seller i is charging $t_1^*, t_2^*, t_3^*, \ldots, t_M^*$ per customer transfer prices to buyers 1 3.3. ... M respectively. Assume that, buyer one has the most. customers. i.e., $N_1 > N_m$ for all $m \geq 2$. Now, assume that buyer one is able to obtain most-favored-customer' terms requiring the seller to charge a per customer price no more than the minimum of prices charged to other buyers. i.e., $t_1 \leq \min\{t_2, t_3, \ldots, t_M\}$ We note that, if $t_m^* \geq t_1^*$ for all $m \geq 2$, then the MFC provision will have no effect on a seller's decision.

For simplicity, assume that t^* takes four possible values $0 = t_4^* < t_3^* < t^* < t_5^*$. In fact,.this analysis applies to any finite number of buyers. In the present, case. there arr some buyers with (non-MFC) transfer prices above t_1^* there are some buyers with (rion-MFC) transfer prices below t_1^*, and there are some buyers who do not, buy from seller i, denoted by $t_4^* = 0$. We denote customers served by different transfer prices t_k^* by$n_1 = N_1$; $n_2 = \sum_{t_m^*=t_2^*} N_m$; $n_3 = \sum_{t_m^*=t_3^*} N_m$; and $n_4 = \sum_{t_m^*=t_4^*} N_m$ where $\sum_{k=1}^{4} n_k = N$.

The hIFC arrangements do not affect the buyers who are paying above buyer one's price. Given the MFC constraint,, the seller has two options. First. the seller could charge $t_1 = t_3 = t_1^*$ and $t_2 = t_2^*$. In this case, the seller serves only the first and second type of buyers) and the seller's revenue is $r_1 = n_1 \cdot t_1^* + n_2 \cdot t_2^*$ Or. the seller could charge $t_1 = t_3 = t_3^*$ and $t_2 = t_2^*$. In this case. the seller serves all the buyers that, it would serve without the MFC and the seller-s revenue is $r_2 = (n_1 + n_3) \cdot t_3^* + n_2 \cdot t_2^*$. We note that only the first and second buyer types are served if $r_1 > r_2 \Leftrightarrow \frac{n_1}{n_1+n_3} > \frac{t_3^*}{t_1^*}$.

Notice the higher n_1 (the market, share of buyer one). the more likely it is that smaller buyers will not buy programming. Also, note that buyer one always buys the product, arid pays. at most, the price under the non-MFC provision. These results are consistent with our findings in Section 4

As noted hove. the model we have constructed must be amended to accommodate the information asymmetries embedded in the sequential bargaining framework of Bykowsky, Kwasnica, and Sharkey (2002). Specifically. in the Bykowsky-Kwasnica-Sharkey model. the sellers do not know the buyers' valuation. arid thus must form some expectation regarding the willingness-to-pay on the part of each individual buyer. Moreover. the seller must determine an optimal trading sequence. Amending our model tu accommodate these conditions is a simple exercise in straightforward logic, as we demonstrate next.

Assume that we have two buyers and single seller where the seller does not know the buyer's valuation of the seller's product. As we showed in Section 4 (equilibria a,c,g,i), it is always optimal for the seller to trade with the larger buyer, but nor the smaller buyer. Thus, the seller will always want to trade with the biggest buyer first, and hence the outcome of the game is the same as if the seller knew, with certainty, the outcome of negotiations with other buyers. Since trading with the smaller buyer first would lock the seller into equilibrium i, if we extend the analysis to the case with more than two buyers, we conclude that the seller would always want to trade with the biggest buyer first,. The determination of a particular equilibrium will depend on the biggest. buyer's market share, the relative valuation of of programming by different buyers, and the uncertainty of the bargaining outcome with the remaining buyers.

Four of the results of the Bykowsky-Kwasnica-Sharkey (2002) experiments are germane to our model. First, Bykowsky, Kwasnica, and Sharkey find that with no channel capacity constraints and no MFC clauses, all of the sellers were able to conduct profitable trades, which is precisely the result our model predicts in Section 2. Second, Bykowsky, Kwasnica, and Sharkey find that with capacity constraints and no MFC clauses, a seller's bargaining power decreased, while a buyer's bargaining power increased relative to the case of no capacity constraints. This result is consistent with our model, as can be seen by comparing (3) in Section 2, with (3) and (7) in Section 3, and noting the extra negative terms in Section 3. Third, Bykowsky, Kwasnica, and Sharkey find that, the existence of an MFC clause increases the profitability of MFC buyers, a result our (extended) Section 4 and 5 model predicts. Finally, note that in our model (where the sellers can make take-it-or-leave-it offers, by assumption), the presence of an MFC arrangement is the only source by which large firms exhibit greater market power. This is exactly paralleled by the results of the Bykowsky-Kwasnica-Sharkey study.

VI Conclusion

In this paper, we explored the use of 'most-favored-customer' clauses in the cable industry. We examined the impact of MFC clauses on bargaining outcomes between buyers and sellers, and showed that these outcomes depended on the market share of the larger buyers and the relative per-customer valuation of the seller's programming to different buyers.

We showed that both with and without channel capacity constraints, in the absence of MFC clauses, the market outcome is efficient. However, the introduction of MFC clauses can disadvantage sellers and small buyers. We found that as the market share of the large buyer increases, smaller buyers are more likely to be disadvantaged. Specifically, we found that if there is a disparity in the relative valuation of programming among buyers, in the case where the large buyer has a greater per-customer valuation, smaller buyers may be precluded from access to the programming because of its relative expense.

We extended our model to accommodate the methodology utilized in the experimental studies conducted by Bykowsky, Kwasnica, and Sharkey (2002) and demonstrated that our prediction that an MFC arrangement yields market power is supported by their data. Bykowsky, Kwasnica, and Sharkey find that with no channel capacity constraints **and** no MFC clauses, all of the sellers were able to conduct profitable trades, which is precisely the result our model predicts in Section 2. *Consistent with the* experimental results, our model predicts that under capacity constraints and no MFC clauses, a seller's bargaining power decreases, while a buyer's bargaining power increases relative to the case of no capacity constraints. Bykowsky, Kwasnica, and Sharkey's findings that the existence of an MFC clause increases the profitability of MFC buyers is a prediction of our (extended) Section 4 and 5 model. In our model, the presence of an hIFC *arrangement* is the only *source* by which large firms exhibit greater market power. This is exactly paralleled by the results of the Bykowsky-Kwasnica-Sharkey study.